

STATE OF CALIFORNIA
ENERGY RESOURCES CONSERVATION
AND DEVELOPMENT COMMISSION

In The Matter Of)	Docket No. 96-RDD-1890
Implementation of Restructuring)	
Legislation (Public Utilities)	
Code Section 381, [AB 1890]): RD&D)	
<hr/>)	

STRATEGIC PLAN REPORT ON
IMPLEMENTING THE RD&D PROVISIONS OF AB 1890
(FEBRUARY 27 DRAFT)

Submitted to the California Energy Commission's RD&D Committee
Submitted by the Public Interest RD&D Advisory Group
Submitted on March 24, 1997

RD&D STRATEGIC PLAN REPORT

TABLE OF CONTENTS

CHAPTER I: INTRODUCTION	1-1
A. Background Concerning This Advisory Group Report	1-1
B. Description Of The Advisory Group Participants And Process	1-2
C. A Brief Summary Of the Strategic Plan Chapters Which Follow	1-3
CHAPTER II: MISSION AND OBJECTIVES	2-1
A. Background Concerning Development Of The Mission And Objectives	2-1
B. Mission And Objectives For This Public Interest RD&D Program	2-2
C. Issues Concerning The Recommended Mission And Objectives	2-4
CHAPTER III: RD&D FOCUS AREAS AND OBJECTIVES	3-1
A. Introduction	3-1
B. Focus Areas And Objectives For ERC	3-2
C. Eligibility And Selection Guidelines	3-10
D. Project Selection Process	3-12

TABLE OF CONTENTS (cont.)

CHAPTER IV: GOVERNANCE AND ADMINISTRATION	4-1
A. Overall Governance Structure	4-1
B. Roles And Functions Of The Administrator	4-2
C. Roles And Functions Of Advisory Groups	4-5
D. Remaining Steps Which Need To Be Implemented . . .	4-7

RD&D STRATEGIC PLAN REPORT

CHAPTER I: INTRODUCTION

A. BACKGROUND CONCERNING THIS ADVISORY GROUP REPORT

On September 23, 1996, Governor Pete Wilson signed into law landmark legislation that will bring substantial competition to California's electricity industry. (Chapter 854, Statutes of 1996 (AB 1890)). With regard to energy-related research, development and demonstration (RD&D) activities, AB 1890 specifically requires the California Energy Commission (CEC or Commission) to fund certain public interest RD&D efforts that will advance science or technology not adequately provided by the competitive and regulated markets, pursuant to "administration and expenditure" criteria established by the Legislature. (Public Utilities Code Sections 381(a), 381(b)(2), 381(c)(2), and 381(f)). The California Public Utilities Commission (CPUC) is given responsibilities for other specified RD&D activities.

At an en banc hearing on October 16, 1996, the CEC determined that a plan would be developed for implementing the public interest RD&D provisions of AB 1890, and the Commission would also provide input to the Legislature regarding the appropriate administration and expenditure criteria for this RD&D program. The CEC then assigned these matters to its RD&D Committee with directions to (1) conduct collaborative, non adjudicatory, public hearings and workshops on these topics through May of 1997; and (2) prepare a proposed RD&D plan for the full Commission's consideration and adoption by mid-1997.

The RD&D Committee held its initial public hearing regarding these matters on December 2, 1996. Shortly thereafter, an RD&D Advisory Group (AG) was formed to prepare recommendations for the

Committee on implementing the public interest RD&D provisions of AB 1890.

The AG held seven, day-long, public workshops throughout the state from December 17, 1996 through March 24, 1997, and updated the RD&D Committee regarding its work-in-progress at a public hearing held in Sacramento on January 29, 1997. At that time the Committee also received recommendations from the AG regarding appropriate "administration and expenditure" criteria for consideration by the Legislature.

The AG has now completed its **"Strategic Plan Report On Implementing The RD&D Provisions Of AB 1890"** (Strategic Plan Report or Report), and hereby submits that Report to the RD&D Committee for a public hearing presently scheduled on March 27, 1997. It is the AG's understanding that following the hearing, the RD&D Committee will prepare its proposed Public Interest RD&D Strategic Plan for consideration and adoption by the full Commission later this summer. Actual implementation of the public interest RD&D program, in accordance with the Commission's Final Adopted Strategic Plan, is currently expected to begin on January 1, 1998, as called for in AB 1890.

B. DESCRIPTION OF THE ADVISORY GROUP PARTICIPANTS AND PROCESS

This Advisory Group was open to anyone who wished to participate, and it began work shortly after the Commission's RD&D Committee held its initial hearing on implementing AB 1890 in December of 1996. AG participants represented a broad cross-section of entities concerned with California's energy-related public interest RD&D activities, including representatives from private sector companies, investor-owned and municipal utilities, state and federal research organizations, universities, public interest organizations, and various government agencies.

At least 50 people regularly attended all AG workshops throughout the state, and the AG's mailing list contains over 500 names. (See Appendix I-A). Approximately 40 separate parties are now official signatories to this AG report. (See Report Transmittal Letter to the RD&D Committee, dated March 24, 1997).

As noted above, the AG held seven day-long workshops between December 17, 1996 and March 24, 1997, and these workshops were conducted at various locations throughout the state (e.g. San Diego, Burbank, San Francisco, Berkeley and Sacramento). Each workshop was publicly noticed well in advance, both by traditional and by electronic publication means, and all workshops were open to anyone who wished to attend.

The AG members agreed to strive for consensus on key issues wherever possible, and to provide an accurate "sense of the group," including pros and cons of different options, when consensus could not be reached. (See Appendix I-B for complete minutes of all workshops prior to adoption of this report on March 24, 1997). The RD&D Strategic Plan Report reflects the informative and constructive input which resulted from this four month long public process.

C. A BRIEF SUMMARY OF THE STRATEGIC PLAN CHAPTERS WHICH FOLLOW

After the AG reached agreement on its decision-making process, participants turned to the major RD&D Strategic Plan topics on which the Committee and Commission are seeking input. These topics are addressed in the following chapters of this Strategic Plan Report.

Chapter II first identifies the primary "Mission" and "Objectives" which the AG believes that California's energy-related public interest RD&D program (referred to herein as "Energy Research California" or "ERC") should seek to accomplish.

The Mission and Objectives contained in Chapter II are also intended to provide a fundamental framework for the "administration and expenditure" criteria which the Legislature is expected to adopt later this year. In essence, the AG recommends that the ERC program be designed to further California's long-standing mission of providing environmentally sound, safe, reliable and affordable energy services and products to its citizens. This mission is to be achieved by focusing on specified RD&D activities, while implementing the ERC program in an efficient, merit-driven, and public manner.

Chapter III identifies the major substantive RD&D categories and objectives which the ERC program must address. These focus areas include renewable energy, energy efficiency, environmental protection, and other strategic energy research. The chapter also sets forth eligibility guidelines, selection criteria, and a selection process by which projects seeking funding from the ERC program can be evaluated.

Chapter IV outlines the means by which the ERC program should be governed and administered. This chapter identifies various governing and/or administrative functions which must be addressed (e.g. policy input, project funding mechanisms, coordination, program evaluation, etc.), and then discusses the role of the governing structure, program administrator(s), and advisory groups in carrying out these various functions. The chapter and report ends by listing the remaining steps which must be taken during 1997 if the ERC program is to be fully operational on January 1, 1998, as AB 1890 and the AG itself intend.

RD&D STRATEGIC PLAN REPORT

CHAPTER II: MISSION AND OBJECTIVES

A. BACKGROUND CONCERNING DEVELOPMENT OF THE MISSION AND OBJECTIVES

The RD&D Advisory Group (AG) initially realized that two fundamentally different types of planning documents are needed to successfully implement California's energy-related public interest RD&D program, to wit: (1) a "Strategic Plan," which broadly describes the overriding "vision" and the general methods for implementing the RD&D provisions of AB 1890; and (2) an "Operational Plan," which subsequently provides the essential details needed to carry out the strategic document. The AG also recognized that given the size of this advisory group, and the short timeframe for implementing AB 1890, the AG would only be able to make recommendations concerning the Strategic Plan itself; the Operational Plan would have to be developed subsequently by those responsible for actually administering and implementing the energy-related public interest RD&D program. (The AG labeled this public interest RD&D program "Energy Research California" or "ERC," and it will be so referred to throughout the remainder of this report).

With this orientation in mind, the AG quickly reached a consensus on the need to identify the basic "Mission"¹ and an essential set of "Objectives"² for the RD&D Strategic Plan. The

¹ The word "Mission" as used in this report means a broad-reaching general statement that provides guidance for the development of goals and objectives. It can be characterized as "where you want to go to" or "what you ultimately want to achieve."

² The word "Objective" as used in this report means a statement of intent that leads to the attainment of the mission, but is not necessarily focussed or measurable.

group also agreed that its strategic statement of Mission and Objectives should be used as the fundamental framework for any "administration and expenditure" criteria which the Legislature subsequently adopts in implementing the RD&D provisions of AB 1890.

In discussing and developing its recommended Mission and Objectives, the AG took note of both the **"Working Group Report On Public Interest RD&D Activities,"** submitted to the CPUC on September 6, 1996 (See Appendix II-A), and the many important ideas presented by a large number of RD&D experts who testified before the CEC's RD&D Committee during a day-long hearing on December 2, 1996. (See Appendix II-B for a summary of the **"Lessons Learned"** from that Committee hearing). Based on these outstanding background materials, and the extensive practical experience and knowledge of many of the individuals within the AG itself, the group decided that the Mission and Objectives for the Strategic Plan, and the Legislature's related "administration and expenditure" criteria, should identify the key "substantive" areas of program focus, as well as the major "process" objectives which the ERC program should achieve when being implemented.

A fundamental tenant which the AG sought to reflect in its recommended Mission and Objectives is the need for balance between competing imperatives, such as conducting a focussed yet flexible program, which is merit-driven and efficient but also responsive to public input and concerns. With this background in mind, we now turn to the Mission and Objectives which the AG recommends to both the Commission's RD&D Committee and to the Legislature.

B. MISSION AND OBJECTIVES FOR THIS PUBLIC INTEREST RD&D PROGRAM

The Mission and Objectives set forth below were developed by the AG as an integrated set of policies to provide direction for the ERC program. Thus, for example, while concepts included in the

Mission statement are not specifically restated in the Objectives, all elements should be considered to be of equal importance in the Strategic Plan.

Moreover, in order to maintain California's national and international leadership role in the field of energy, the AG strongly recommends that the Legislature embody the following Mission and Objectives in any "administration and expenditure criteria" which it may adopt when implementing the RD&D provisions of AB 1890.

MISSION: The mission of "Energy Research California" is to conduct public interest energy research that seeks to improve the quality of life for California's citizens by providing environmentally sound, safe, reliable and affordable energy services and products. "Public interest energy research" includes the full range of research, development and demonstration activities that will advance science or technology not adequately provided by competitive and regulated markets.

OBJECTIVES: The objectives of "Energy Research California" are to:

#1. Develop and implement a robust public interest RD&D portfolio of projects that addresses California's energy needs and primarily focuses on energy efficiency, renewable energy technologies and environmental issues.

#2. Create and maintain a public interest RD&D program that balances risks, timeframes and public benefits in a manner consistent with California's energy policies.

#3. Create a public interest RD&D knowledge base that will allow citizens, businesses, government and other entities to make informed decisions concerning energy technologies and services.

Option #4(A). Support public interest RD&D projects that are connected to the market by (a) assisting in the assessment of energy technologies and market needs; and (b) assisting in the transfer of technologies from RD&D into the marketplace.

Option #4(B). Support public interest RD&D projects that will foster: (a) the development of energy technologies and services which have the potential to be cost-competitive in an evolving deregulated electricity marketplace; and (b) the effective transfer of pre-commercial technologies and services into a competitive marketplace.

Option #4(C). Ensure the relevance of the project portfolio to the State's economy by (a) incorporating the assessment and understanding of market needs into appropriate phases of projects; (b) facilitating the transfer of ERC RD&D into the marketplace through partnerships; (c) collaborating with market and public-interest stakeholders to determine research needs; or (d) considering market needs during program planning.

#5. Ensure public input and accountability for the public interest RD&D program by: (a) conducting an open and flexible planning and decision-making process which involves stakeholders in both planning and implementing the program; (b) using advisory committees and expert panels to guide programs and evaluate project proposals; and (c) using an independent group for periodic overall program review and evaluation.

#6. Ensure the efficient administration and stewardship of public interest RD&D funds by: (a) implementing a streamlined project acquisition and funding process; (b) using prescribed project evaluation criteria to select projects based on technical merit; (c) leveraging limited public interest RD&D funds through public/private partnerships to the extent possible; (d) managing projects flexibly and effectively; (e) establishing a personnel process which will attract and retain motivated individuals with technical knowledge; and (f) avoiding excessive overhead costs.

#7. Provide leadership and coherence for California's public interest RD&D efforts by: (a) coordinating with public and private RD&D entities; and (b) integrating this effort with the Energy Efficiency/Renewables programs and other public interest energy efforts.

C. ISSUES CONCERNING THE RECOMMENDED MISSION AND OBJECTIVES

While the AG held extensive and animated discussions during its "word-smithing" of the Mission and Objectives above, there was remarkable unanimity within the group on virtually all of the major points contained therein. Only three issues warrant any further discussion in this report.

First, a few members of the group raised concerns about whether the Mission of the ERC program should focus exclusively on "electricity" as opposed to "energy" products and services, since electricity ratepayers alone are presently required to pay for the

RD&D surcharge. While this "equity" concern was readily understood by the group, it was pointed out that many RD&D efforts often cut across energy lines, thereby impacting electricity users even when electricity *per se* is not the focus of the inquiry (e.g. RD&D concerning leaky air ducts can provide significant benefits for both natural gas and electricity customers). In keeping with its preference for granting reasonable flexibility to the ERC administrator wherever possible, the AG decided to use the word "energy" rather than "electricity" in its recommended Mission statement.

Second, the group discussed whether the focus area of "energy efficiency" (in Objective #1) should be limited to "end-use" efficiency only. It was noted that RD&D activities pertaining to "generation" efficiency may be viewed by some as more appropriate for the competitive sector to fund, particularly given the rapidly emerging deregulation of the generation market. However, other group members strongly pointed out that not all areas of "generation" research are competitive, and that many ongoing market failures continue to exist in this area. After considerable discussion, the AG agreed to leave the term "energy efficiency" unrestricted, and to allow the ERC administrator discretion to address this issue subsequently on a project-by-project basis.

Finally, the group could not quite bridge the word-smithing gap in its efforts to articulate Objective #4. The AG is concerned with insuring that public interest RD&D efforts are sufficiently "connected to the market" to avoid the so-called commercialization "Valley of Death," in which successful RD&D projects nevertheless fail to yield commercially useful products and services, thereby effectively wasting the RD&D funds which have already been expended. However, the group is also aware that public interest RD&D funds are extremely limited, and should not be used for near-term "commercialization" efforts which are better funded by other public interest programs (e.g. the Renewables and/or the Energy

Efficiency programs) or by the private sector itself. In the end, three different versions of Objective #4 have been presented for the Commission's consideration, and each of these options seeks to address the "commercialization" balancing issue which is described above.

RD&D STRATEGIC PLAN REPORT

CHAPTER III: RD&D FOCUS AREAS AND SELECTION PROCEDURES

A. INTRODUCTION

The Advisory Group (AG) recommends that implementation of Energy Research California (ERC) program will be broadly focussed in four areas: renewable energy, energy efficiency, environmental protection and strategic energy research. The first three focus areas were also recommended in the **"Working Group Report on Public Interest Research, Development and Demonstration Activities,"** submitted to the CPUC on September 6, 1996. The current Advisory Group (AG) concurred in the importance of these three focus areas, and added an additional area to ensure the funding of innovative, strategic projects and activities that may cut across two or more focus areas, or represent "order of magnitude" technological advances.

These four focus areas are intended to provide strategic program structure, and are not necessarily intended to define specific program boundaries. Possible ways of structuring these ERC focus areas include organizing by energy sectors, by types of solicitations, or by the four focus areas themselves. The program structure should be defined in the Operational Plan.

The Mission and Objectives, discussed earlier in Chapter II of this report, are intended to provide overall guidance for implementing the RD&D activities in each of the focus areas. The ERC administrator(s), in coordination with advisory committees at both the policy and technical levels, will develop specific criteria for funding projects and activities in each of the focus areas. Given the uncertain, yet dynamic conditions brought about by deregulation and other factors, it is vital to build flexibility into the process to allow the ERC portfolio to be responsive to changing technology push and market pull factors across the spectrum of public interest energy RD&D activities.

An essential goal of the ERC program is to implement a portfolio of projects balanced across focus areas, timeframes to commercialization, public benefits and risks of failure. It will be important to fund some innovative, possibly high-risk research that has the potential for substantial public benefits, along with mainstream research with public benefits, low risks and a close connection to the market. Within this context, the projects funded by the ERC program should address one or more of the five generic justifications for performing RD&D activities, i.e. reduced capital costs, improved performance, lower operation and maintenance costs, reduced environmental impacts, and reduced building costs.

Collaborative research is another important goal. Projects funded through RD&D consortia spread risks, pool creative and administrative resources, leverage limited RD&D funds, speed innovation, and accelerate commercialization. In implementing public interest energy research, the ERC administrator(s) and advisory committees will need to look for potential synergies across focus areas and consortia lines.

B. FOCUS AREAS AND OBJECTIVES FOR THE ERC PROGRAM

Following are descriptions of the major focus areas for the ERC program, along with important issues and the objectives for each of these focus areas. It was generally agreed that these focus areas and objectives should be framed broadly and at a high level to allow research providers and the ERC administrators flexibility to pursue innovative concepts and research approaches.

1. Renewable Energy Focus Area and Objectives

Definition: Renewable energy is broadly defined to mean electricity generation or related end-use applications by technologies that rely primarily on renewable fuels such as solar

radiation, geothermal brines and steam, biomass, water and wind for conversion to energy. Hybridization of renewable technologies with fossil-fuel fired energy to allow the renewable technologies to be more competitive in a deregulated market is acceptable within the definition of renewable energy. Examples of renewable energy include: photovoltaic systems; solar thermal generation; wind turbines; hydropower; generation and end-use utilization of geothermal resources; and the direct combustion, gaseous conversion, anaerobic digestion, fermentation or other conversion of biomass residues and wastes to energy.

Renewable energy provides public benefits such as energy diversity and security, improved environmental quality, increased benefits to local and regional economies, improved management of natural resources through the use of indigenous energy resources and protection of public health and safety.

Issues: The primary issue confronting almost all renewable energy applications is how to compete in a deregulated electricity market. Recognizing this dilemma, the Legislature established a \$540 million four-year fund under AB 1890 to help existing, new and emerging renewables transition to a competitive market. This fund is for renewable projects utilizing commercially available technologies. However, there is also a need for RD&D to advance renewable technologies toward a cost-competitive stance. Therefore, one of the ERC focus areas is renewables. The AG recommends that the ERC management coordinate its renewable energy RD&D activities with the AB 1890 Renewables program in order to realize synergies between the two efforts and to avoid unnecessary duplication.

Opportunities also exist for most renewable technologies to overcome critical technical barriers in the areas of reducing environmental impacts, increasing efficiency and tapping the benefits of system integration. The AG recommends that ERC funding be made available for these types of activities. (A sample matrix from the CEC's "Energy Technology Status Report" will be provided at the Feb. 27 workshop as a possible inclusion in this report to show the relationship between some technologies and the generic justifications for RD&D that were described in the Introduction to Chapter III).

Objectives in the renewable energy focus area include:

- RD&D concerning new technologies or approaches that enhance the technical proficiency and/or affordability of renewable energy resources;
- Providing analytical tools and information to improve renewable energy products and services; and
- Coordinating with other existing and emerging energy technologies or approaches to enhance the diversity and sustainability of California's energy resources.

2) Energy Efficiency Focus Areas and Objectives

Definition: Opportunities exist for the more efficient use of energy throughout the entire fuel cycle, from the prime energy source (fuel) to the final services provided. Using traditional fossil fuel as an example, the fuel cycle starts with the fuel in the ground. The next step is to extract the resource, then refine and convert it. At this point, the fuel is transported to the user, where it is then combusted/converted to provide a particular product or service.

The energy efficiency focus area includes all of the steps in the fuel cycle. Energy efficiency can be broadly defined as those things which either reduce energy demand or which increase the efficiency of energy conversion. Public benefits achievable in the efficiency focus area include improved air quality, decreased use of fossil fuels and increased statewide, or regional economic benefits.

Issues: The first challenge for the efficiency focus area will be to assess where the greatest public interest benefits come from in the overall fuel cycle. While the focus has traditionally been on improving the efficiency of end-use technologies, it may be that the public is also well served by research that improves technical efficiencies closer to the fuel source.

Within any given technical area, the most important efficiency issues are generally increasing technical performance and reducing manufacturing costs. Another important efficiency issue is understanding the relationship between more efficient technical choices that are competing for the customer's attention in the market place. Finally, a major efficiency concern is how to more directly connect RD&D activities to the markets that will use the resulting products. (A sample matrix from the CEC's "Energy Technology Status Report" will be provided at the Feb. 27 workshop as a possible inclusion in this report to show the relationship between some technologies and the generic justifications for RD&D that were described in the Introduction to Chapter III).

The AG recommends that ERC funding be available for RD&D projects and approaches that increase the efficient use of energy and/or reduce consumption resulting in reductions of energy use. Possibilities should be explored in each part of the fuel cycle. The ERC administrator(s) and advisors need to be cognizant that small improvements in efficiency closer to the fuel source (upstream) can have as large of an overall effect as larger improvements closer to the end-use (downstream) because of energy losses due to conversion efficiencies and/or transportation losses that occur throughout the fuel cycle. A strategy that maximizes efficiency throughout the fuel cycle will result in the greatest economic and environmental benefits. The ERC administrator(s) should also consider RD&D opportunities that effectively eliminate the need to generate electricity for a particular end-use service as high priority for funding.

Objectives in the energy efficiency focus area include:

- RD&D concerning technologies and processes that would increase the energy efficiency of technologies, products and services;
- RD&D technologies and processes that would reduce the energy use of technologies, products and services;
- Providing analytical tools and information to improve energy efficient technologies, products and services; and

- Coordinating with other energy technologies or approaches to enhance the efficient use of California's energy resources.

3) Environmental Focus Areas and Objectives

Definition: We are learning that human health, whether physical, economic, social or recreational, is best served by maintaining a healthy environment. The way we produce, transmit and use energy greatly impacts the quality of life for both people and the other species with whom we share this planet. Energy production, delivery and use affect the quality of our air, the quality and availability of our water resources, the populations and habitat of aquatic and terrestrial wildlife and plants, our aesthetic response to the viewshed, the occurrence of hazardous material and toxic wastes, and our cultural and recreational resources. These impacts are usually difficult to quantify and to separate from impacts from non-energy influences.

The environmental focus area of the ERC program should include the environmental impacts that result from all of the steps in the fuel cycle. The environmental efforts of ERC will aim at reducing, preventing, or mitigating the environmental costs of energy production, and use in California as well as exploring how new energy applications can solve non-energy environmental issues.

Issues: The AG believes that the success of the ERC's environmental efforts will largely hinge on the ability to quantify and isolate the most significant negative environmental impacts of energy production and use. Much site-specific or topic-specific data on this issue has been gathered by researchers in California. However, there has been little coordinated effort to solve the environmental problems of energy production and use or to solve non-energy environmental issues through new energy applications on a statewide level to date. It is recommended that a substantial focus of the ERC program's environmental efforts be directed towards isolating, quantifying, and/or analyzing the negative impacts of energy production and use and the benefits of applying renewable energy technologies when compared to conventional technologies or when

compared to the status quo. For example, there is a need to quantify the relative environmental and social benefits of combusting forest fuels in biomass plants versus the same biomass being consumed in uncontrolled wildfires.

One promising research angle is investigating how electrical applications can entirely replace a conventional polluting industrial technology. For example, a furniture manufacturing firm in southern California was in danger of having to leave the air basin due to its emissions from the conventional volatile finishes it applied to its products. Ratepayer funded research helped the industry design a finish that cured under UV light, resulting in zero emissions. This is the kind of innovative thinking that can help solve California's energy-related environmental challenges.

Some specific environmental issues of energy production, delivery and use in California that would benefit from the ERC program include:

Biomass Fuel: Emissions of nitrogen, carbon, and sulfur oxides and combustion particulates and ash disposal.

Geothermal: Water use for cooling and reinjection; disposal of H₂S abatement residue; disposal of drilling fluids and non-reinjected thermal fluids; air emissions during drilling, during open-loop system operation, and from cooling towers; ground subsidence, habitat disturbance, viewshed disturbance, and noise pollution during drilling and operation.

Hydroelectric: Fish kills through water temperature changes, disruption of migration, and in turbines; viewshed disturbance; mitigation for flooding of wildlife and plant habitat, and flooding of cultural and recreational sites.

Fossil Fuel Combustion: No_x emissions and PM₁₀ particulates (standard soon to be raised to PM_{2.5}); CO₂ emissions.

Solar: Habitat and viewshed disturbance, heat transfer fluids are often toxic.

Wind: Noise pollution, bird collisions with rotors, erosion from road and pad construction, and visual impacts.

Objectives in the environmental focus area should include:

- RD&D concerning technologies and processes for reducing or preventing environmental impacts and related costs of energy production, delivery and use;
- Providing analytical tools and information to enhance environmental quality beyond current regulatory standards; and
- Coordinating with other energy and environmental efforts to enhance California's overall environmental quality.

4) Strategic Energy Research Focus Areas and Objectives

Definition: Strategic energy research encompasses RD&D activities that cut across two or more of the focus areas described above, represent potential "order of magnitude" technological advance, or provide energy-related public interest information assessments and/or innovations that do not fit within the other three focus areas. For example, assessments of energy-related technology, market or institutional barriers could be performed within this focus area.

This focus area affords an opportunity for synergistic research whose advances benefit a number of focus areas as well as system integration projects. This focus area could include: (1) innovative projects and activities that result in "leapfrogging" technological advance; (2) the development of "enabling" technologies, i.e. a core concepts that create numerous opportunities for the development of subtechnologies, products and services; and/or (3) the development of "infratechnologies"¹, i.e. fundamental advances in integrated systems or processes that pave the way for competitive development.

Fuel cells have been used as an example of an enabling technology. Due to their high

¹ From "Challenge and Change in Collaborative Research", Ric Rudman and Peter Jaret, EPRI Journal, Jan/Feb 1997

efficiency and versatility in application, fuel cells are enabling the development of both transportation and distributed generation technologies potentially utilizing both fossil and renewable fuels. Advanced metering technologies are an example of "infratechnologies;" deregulation of the electricity market in a practical sense is only possible since the advent of these technologies.

Public benefits in the strategic research focus area mirror those in the other focus areas, but have the potential to be of greater magnitude.

Issues: Issues of concern in the strategic energy RD&D focus area include the high risk of not achieving research goals, the high first cost of technology, and the need for a highly competent, well-coordinated research teams with diverse technical expertise. Given that higher risk strategic energy research efforts also generally entail higher benefits if successful, there is a niche for these projects in the ERC portfolio.

Other issues for this focus area might include cross-cutting institutional and market barriers that impede the commercialization of energy technologies (e.g. inequitable tax treatment of differing energy technologies).

Objectives in the strategic energy RD&D focus include:

- RD&D concerning innovative concepts in energy technologies and related information services that are cross-cutting, or do not fall into other focus areas;
- Collecting information and conducting assessments on cross-cutting strategic issues affecting all focus areas; and
- Supporting the integration of new technologies or processes into California's energy system.

C. ELIGIBILITY AND SELECTION GUIDELINES

The eligibility and selection guidelines recommended below can be applied to all RD&D activities under consideration, across all focus areas, and regardless of whether projects are funded through solicited or unsolicited proposals. More specific eligibility and selection criteria will need to be developed through the Operational Plan.

1. Eligibility Guidelines

The AG recommends that eligibility guidelines become the first level of screening for proposals submitted to the ERC program for funding consideration. At the end of this screening, an eligibility "go" or "no go" decision should be made; either a proposal is judged to be eligible for consideration or not. Projects which are not eligible will not require further expenditure of limited overhead funds. The AG recommends the following as eligibility screening guidelines for the ERC program:

- Projects must meet the statutory definition of public interest RD&D, i.e.---
 - Advances science or technology which provides benefits to California citizens; and
 - Is not adequately addressed by competitive and regulated markets.
- Projects must be consistent with the ERC Mission and Objectives.

2. Selection Guidelines

Once a proposal is judged to be eligible for ERC funding consideration, the AG recommends that it be reviewed and evaluated according to the following merit based selection guidelines:

Public Benefits: Evaluate levels of public interest and private benefits compared with the project costs to be funded by the ERC and collaborative participants. Public benefits can include improvements to the quality of the environment, cost-effective utilization of indigenous and /or renewable sources of energy, reduction in statewide energy and peak load requirements, increases in the overall efficiency of generation or end-use of energy, and positive impacts on the economies at the regional or statewide levels.

Quality of Proposed Project: Determine the degree to which the proposed project helps to advance the objectives of one or more of the ERC program focus areas. Evaluate the quality of the proposal to determine if the project goals and objectives represent technically viable means to resolve the major technical barriers. Determine whether the proposal describes the relationship of any related RD&D efforts to ensure the proposal represents a synergistic approach without duplication of effort. Confirm that there is a realistic vision for transferring results of the project into the marketplace within a defined timeframe. Evaluate the size of the applicable niche and/or mass markets and gage the likelihood for commercial success. Evaluate whether the budget and timeframe for the proposal are sufficient to achieve the desired results.

Quality of Research Team: Gage the strength and viability of the proposer's team based on: (1) the knowledge, qualifications and experience of key individuals; (2) the team's past performance and financial stability; (3) the team's plans for, and track record of, transferring research results into the marketplace; (4) the plans for collaboration; and (5) the proposed level of cost-sharing.

Policy Consistency: Assess the policy consistency of the proposal by balancing the technical, market and financial risks of the project and the likelihood of and timeframe for success. Weigh the results of these evaluations with the degree to which the proposal advances the objectives of one or more focus areas, and is consistent with State energy policy, to determine if the proposal fits into a balanced ERC portfolio.

Preferences: Evaluate preferences and other considerations (e.g. project and/or lead entity is located in California).

D. SELECTION PROCESS

The AG recommends that the Strategic RD&D Plan establish the overall ERC program

direction through its focus areas and objectives. We also recommend that merit be the primary basis for project selection, determined primarily through a competitive process. However, the Strategic Plan should not establish fixed percentages for focus areas or other specific measures of balance, recognizing that program balance will be established in relation to the actual portfolio of existing projects and incoming proposals.

The Operational Plan subsequently developed by ERC administrator(s) for each focus area should further guide the implementation of a balanced portfolio of projects. The specific sequence of the project selection process should be spelled out in the Operational Plan.

The ERC administrator(s) and advisors should evaluate new proposals and existing projects using the eligibility and selection guidelines adapted into a qualitative and quantitative evaluation framework. The selection process applies to the following types of proposals: (1) a response to a competitive solicitation; (2) unsolicited; (3) part of a multi-year solicitation; and (4) a block grant program.

The selection process should allow flexibility for the ERC Administrator(s) and advisors to exercise their best professional judgment to identify opportunities for collaboration, potential for cost-sharing, and options for exchange of results. The ERC Administrator(s) and advisors should attempt to maximize synergies among projects and proposals, while ensuring consistency with the ERC program's overall Mission and Objectives.

REVISED DRAFT OUTLINE FOR CHAPTER IV (February 25, 1997)

CHAPTER IV- GOVERNANCE AND ADMINISTRATION OF ERC

A. Overall Governance

The overall governance structure of ERC should be capable of effectively carrying out the Mission and Objectives of the organization. In particular, the governance structure must be designed and streamlined to ensure public input and accountability, efficient administration and stewardship of resources (e.g. in contracting, personnel and budgeting), and statewide leadership for California's public interest RD&D efforts.

ERC will perform a variety of activities including technology and market assessments, overall management and review of the program and projects, coordination and collaboration with other research organizations and programs, and advisory committee guidance.

B. Roles and Functions of ERC

- 1) Policy implementation.- The ERC will provide input to the formulation of state policies on ERC mission and objectives, with an emphasis on articulating the role and benefits of public interest energy RD&D. The ERC will also be responsible for implementing state policies related to its mission or objectives.
- 2) Program planning.- ERC planning will be undertaken at levels corresponding to its organizational structure and funding areas.

ERC, with active support from its advisers and any interested stakeholders, will annually update its high-level plan that addresses the role and needs of public interest RD&D. It will provide broad outlines of the appropriate areas of RD&D focus, analogous to the descriptions or research areas and objectives contained in this plan. The plan will explicitly recognize the status and anticipated role of multi-year research endeavors within the larger scope of the ERC program. This plan will be the underpinning for the portion of ERC's program developed through an open, competitive solicitation process.

A second layer of planning will support the portion of ERC's program that is allocated to targeted grants, contracts and sole-source solicitations. Targeted research areas will be proposed by the ERC using the broad plan described above as a starting point. ERC and its advisors will describe a limited number of high-need/high-benefit public interest RD&D areas for targeted solicitation and/or grant/ contract awards. ERC will develop this proposed list of targets with support of its advisors, using a stakeholder/public comment process.

These planning processes will be designed for maximum simplicity and efficiency and minimum time and resource requirements. The resulting plans will be responsive to program goals stating the importance of flexibility and proposal merit in program management. The plans will avoid establishing numerous, small funding allocations that, at a minimum, reduce flexibility, and may pre-determine research program outcomes that are not primarily based on the merit of the specific research project proposals

- 3) Establish Project Funding Guidelines and Mechanisms

- a) Funding guidelines should provide for the maximum flexibility to allow projects to be funded primarily based on merit and the project's contribution to the Mission and Objectives of the program. Funding guidelines should address issues such as cost sharing and repayment obligations.
- b) Funding mechanisms should include:
 - (1) block awards to other RD&D organizations
 - (2) individual project funding by:
 - (a) contracts
 - (b) grants
 - (c) block awards
 - (d) loans
 - (3) proposals
 - (a) sole source
 - (b) unsolicited
 - (c) competitive solicitation
 - i) open
 - ii) targeted
- 4) RD&D activities - This will be accomplished primarily by contracting out work rather than by ERC staff conducting RD&D.
- 5) Leadership, coordination and collaboration with other public interest programs:
 - a) seek to leverage and combine other state, federal and private RD&D funds for projects.
 - b) create formal coordination and collaboration arrangements with the other public interest programs, including those administered by the CPUC, Utilities, and the Renewables Administrator.
 - c) coordinate ERC activities with RD&D done by investor-owned and municipal utilities in California, California state colleges and universities, national laboratories, private firms, and collaborative research organizations such as the Electric Power Research Institute
- 6) Technical Management - This ERC function includes activities such as technology and market assessments, project management, and contract review.
- 7) Program Administration - This function includes a variety of activities including overall management and program review, and advisory committee guidance.
- 8) Program Evaluation
 - a) There should be an annual, internal update of the ERC high-level plan;
 - b) There should be a periodic, independent, external program evaluation process;
 - c) The evaluation processes should have qualitative and quantitative components;
 - d) The program measures of success should meet the ERC mission and objectives;

- (1) program benefits
- (2) open and flexible planning process
- (3) effective and efficient program implementation
- (4) public accountability
- (5) effective collaboration with RD&D infrastructure
- (6) cost effectiveness
- (7) balanced portfolio

C. Advisory & Review Committees

Advisory and Review committees will be used to provide policy guidance, technical expertise not otherwise available, market connectedness, coordination and linkage to other RD&D organizations, and review and evaluation assistance. A flexible advisory structure should be created to allow for changing conditions.

Option 1) A tiered advisory structure

- a) *Policy level* - Permanent committee composed of high level executives or appointees, providing overall program policy direction, including focus area objectives, operational policies, funding ranges for focus areas and yearly review of plan and progress. In addition, this permanent committee would periodically select a group of outside experts to conduct an independent evaluation of the ERC process and programs.
- b) *Focus area level* - Temporary committee composed of energy RD&D managers or technical experts. This committee will be organized according to the ERC structure and will provide specific program recommendations, including goals and targets, technology and market need analysis, cross-cutting issues, and funding options.
- c) *Technology/project level* (formed as needed)-- Temporary committees composed of technical experts, providing advice and recommendations on solicitations, project selection, contract management and termination, scoping session and peer reviews.

Option 2)

a) Review Committees

There are two types of reviews: annual reviews of ERC's policies and programs; and periodic external reviews of ERC's performance and viability as an effective organization to conduct public interest RD&D in California.

The annual reviews will evaluate ERC's performance in conducting its RD&D program, market connectedness, and coordination with other RD&D organizations. The annual review will be conducted by a panel composed of one representative each from SCE, SDG&E, PG&E, SoCal Gas, SMUD, LADWP, UC, NRDC, CPUC ORA, and CPUC Energy Division, and three representatives of general consumer groups appointed by the Chair of the CEC (**composition of the committee is subject to AG discussion**). The annual review will be done in the last quarter of each year, so that the results can be incorporated in the following year's plans. The panel will prepare and submit a report of its findings and recommendations to the Chair of the CEC.

The periodic external reviews will be conducted by a specially appointed committee of five, appointed by the Chair of the CEC. Members of the committee will be selected based on their independence, unbiasedness, technical expertise in some aspect of the ERC program, and experience in working with or managing an RD&D program. To avoid any perceived conflict

of interest, individuals currently employed by the CEC or any organization sitting on the annual review panel may not serve on this committee, nor may any individual currently employed by a firm or institution receiving ERC funds serve on this committee.

To facilitate participation on both the annual review panel and the external review committee, ERC is willing to pay travel and other expenses related to these annual meetings for all participants.

b) Advisory Committees

Advisory committees may be formed on an ad hoc basis to provide special advice and recommendations on such things as solicitations, project selection, contract management and termination, project scope discussions, and peer reviews. Participation on these committees will be by invitation only. Travel and other expenses will only be covered under exceptional circumstances.